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Original Research Article

The Prospective Comparative Study of Complications of IPOM and IPOM plus in Umbilical Hernias

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Abstract

Background: An organ or tissue that protrudes abnormally through a gap in its surrounding wall is called a hernia. A hernia that pushes through the anterior abdominal wall fascia is known as a ventral hernia. Umbilical, paraumbilical, epigastric, and midline incisional hernias are examples of midline ventral hernias. Insufficient healing of an earlier incision can lead to incisional hernias.

Objective: The objective of our study was to the incidence of complications like seroma, mesh buldging and recurrences among patients undergoing IPOM and IPOM plus. To observe any swelling, pain, discharges in the umbilicus among the patients who underwent IPOM and IPOM plus on follow up for 6 months after procedure.

Method: We carried out a prospective observation study in the General Surgery department of Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Pondicherry, India, between January 2024 to December 2024, for a period of 12 months and follow up period 6 months. We calculated a sample size of total 30 patients of both genders, aged between 18 and 70 years, presenting with reducible umbilical hernia were included in the study by simple random sampling. We created two groups; Group 1 (IPOM) - 15 patients and group 2 (IPOM PLUS) - 15 patients.

Result: in this study included 30 patients with a male-to-female ratio of 2:1. The mean age of participants was 56.26 years (±8.46), and the mean BMI was 25.5 (±3.09), suggesting that most patients were in the overweight category. The mean defect size was 2.36 cm (±0.67), with variations observed between groups. A significant difference was found between the two groups, with seroma formation occurring in 100% of cases in the IPOM group, whereas no cases were reported in the IPOM Plus group ($p = 0.0317$). Recurrence was observed in 16.67% of cases, occurring exclusively in the IPOM group, while no recurrences were noted in the IPOM Plus group ($p = 0.0476$).

Conclusion: This study concludes that the frequency of postoperative seroma formation and recurrence is lower after laparoscopic (IPOM-Plus) in umblical hernia repair compared to laparoscopic IPOM.

Keywords: IPOM and IPOM Plus, Recurrence, Seroma formation, Umbilical Hernias.

Introduction

An organ or tissue that protrudes abnormally through a gap in its surrounding wall is called a hernia. A hernia that pushes through the anterior abdominal wall fascia is known as a ventral hernia [1]. Umbilical, paraumbilical, epigastric, and midline incisional hernias are examples of midline ventral hernias. Insufficient healing of an earlier incision can lead to incisional hernias [1]. The healthcare system is heavily burdened by abdominal wall hernias. According to a 2019 survey, the general population has a 20.9% prevalence of abdominal wall hernias [2]. Ten percent of all abdominal hernias are umbilic and epigastric [1, 2]. 10% to 50% of laparotomy incisions and 1% to 5% of laparoscopic port-site incisions have been found to have incisional hernias [3]. Patients with ventral hernias typically experience pain, discomfort, and a sensation of bulk. Emergency surgery may be necessary if the bowel becomes incarcerated or strangled, resulting in acute abdominal pain, fever, and obstructive symptoms. Usually, a thorough abdominal examination is enough to establish a diagnosis. Computed tomography (CT) is the most accurate diagnostic radiography technology. The precise dimensions and location of the abdominal wall defect, the extent of muscle atrophy surrounding the defect site, and the connection between the intraperitoneal organs and the hernia sac or abdominal wall defect are all revealed by CT scans [3]. Infection, seroma/hematoma formation, postoperative discomfort, recurrence, and extended

hospital stays can all complicate surgical treatment of ventral hernias. The repair can be performed laparoscopically or openly. A shorter hospital stay, a lower likelihood of recurrence, and fewer postoperative problems are all linked to laparoscopic repair [4, 5]. Due to the improved post-operative results, the laparoscopic technique for ventral hernia repair was first described by Karl Leblanc in 1993 and has since gained widespread acceptance; nonetheless, there are still certain controversial problems surrounding the laparoscopic procedure [6]. A mesh is used to bridge the defect from the peritoneal side during the laparoscopic procedure. The intraperitoneal onlay mesh (IPOM) repair is the term for this procedure. However, it is linked to seromas, recurrences, postoperative mesh bulging or eventration, and nonrestoration of abdominal muscle function [7]. In order to overcome these, IPOM-Plus repair—a sutured closure of the fascia defect combined with intraperitoneal mesh reinforcement—is currently recommended [8]. Conflicting findings have been found in a few studies comparing the outcomes of IPOM and IPOM-Plus.

This study aims to compare the outcomes in terms of seroma formation, recurrences and mesh bulging during IPOM and IPOM plus. The objective of our study was to the incidence of complications like seroma, mesh buldging and recurrences among patients undergoing IPOM and IPOM plus. To observe any swelling, pain, discharges in the umbilicus among the patients who underwent IPOM and IPOM plus on follow up for 6 months after procedure.

Methods

We carried out a prospective observation study in the General Surgery department of Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Pondicherry, India, between January 2024 to December 2024, for a period of 12 months and follow up period 6 months. We calculated a sample size of total 30 patients of both genders, aged between 18 and 70 years, presenting with reducible umbilical hernia were included in the study by simple random sampling. We created two groups; Group 1 (IPOM) - 15 patients and group 2 (IPOM PLUS) - 15 patients. Patients were followed-up immediately after discharge and once in every 15 days for 6 months. Follow up was to rule out seroma, recurrence and mesh bulging by clinical examination and sonological examination (USG).

Inclusion Criteria

Patient who got admitted in surgical ward with reducible umbilical hernia planned for laparoscopic technique are included in this study. Patient age more than 18 years are included in this study.

Exclusion Criteria

In this study, we excluded patients who were not fit for surgery. Patients who had complicated umblical hernia. We excluded patients who were not willing for surgery and denied consent for the study. We excluded patients ages less than 18 years, having icterus, severe anemia (Hb <7 gm/dl), chronic liver disease, inflammatory disease, connective tissue disorder like inflammatory bowel disease or sickle cell disease, HIV positive, patients on corticosteroids therapy, Malnourishment, Malignancy, Diabetes, Metabolic diseases, Radiotherapy and Chemotherapy.

Statistical Analysis: The collected information was analyzed by IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY) software. Age, body mass index (BMI) and Defect size were presented as mean and standard deviation. Gender, Vascular Injury, SEROMA formation, Mesh bulging presence of recurrence were presented as frequency and percentage. The outcome was compared by chi-square test and a P-value $\leq$ 0.05 was considered significant. Independent-t Test and Mann-Whitney U test analysis was done to assess its effect on the outcome. A P-value $\leq$ 0.05 was considered significant.

Results

Table 1: Patient characteristics (total number of cases, n = 30)

Variables	Mean	SD
Age	56.266	8.46
Male	57.2	8.6
Female	55.8	8.58
BMI	25.5	3.092
Male	24.78	1.8
Female	25.4	3.56
Defect size (in cm)	2.36	0.67

Table 1, in this study included 30 patients with a male-to-female ratio of 2:1. The mean age of participants was 56.26 years (±8.46), and the mean BMI was 25.5 (±3.09), suggesting that most patients were in the overweight category. The mean defect size was 2.36 cm (±0.67), with variations observed between groups.

Table 2: Patient sub-category group (total number of cases, n = 30)

Characteristics	Sub-category	n	%
Gender	Female	10	66.7%
	Male	20	33.3%
Vascular Injury	No	30	100.0%
SEROMA	Yes	4	13.33
	No	26	86.67
Mesh bulging	Yes	30	100%
	No	10	66.7%
Recurrence	Yes	20	33.3%
	No	30	100.0%
Group	IPOM	15	50.0%
	Plus	15	50.0%

Table 2, Female were 10 (66.7%) while male 20 (33.3%) observed that male ration were more than female. Vascular Injury not presented in the patients while IPOM plus. Seroma formation was found in 4 (13.33 %) patients. Mesh bulging complications were found in 30 (100%) patients. Recurrence was identified in 20 (33.3%) patients.

Table 3: Inferential

Variables		Total		Group				p-value
				IPOM		Plus		
		n	%	n	%	n	%	
Gender	Male	10	66.7%	5	50.0%	5	50.0%	1*
	Female	20	33.3%	10	50.0%	10	50.0%	
Vascular Injury	No	30	100.0%	15	50.0%	15	50.0%	
SEROMA	Yes	4	13.33	4	100%	0	14.29%	0.0317*
	No	26	86.67	11	42.31%	15	57..69%	
Mesh bulging	No	30	100%	15	50%	15	50%	
Recurrence	Yes	0	0.00	3	16.67%	0	0.0%	0.0476*
	No	25	83.33	12	44%	15	56%	
*Chi-square test was applied								

Table 3, between the IPOM and IPOM Plus groups, in Gender; out of Male 10 (66.7%), IPOM group were 5 (50%) and 5 (50%) IPOM plus equally distributed.

Also out of Female 20 (33.3%), IPOM group and IPOM plus 10 (50.0%) were equally distributed (P-value=1) by Chi-square test. Vascular Injury not presented in the patients IPOM and IPOM plus. Seroma formation was found in 4 (100 %) patients IPOM (P-value=0.0317) by Chi-square test.

In Mesh bulging no any complications were found in 30 (100%) patients IPOM and IPOM plus. Recurrence 3 (16.67%) in patients IPOM group (P-value=0.0476).

Table 4: Observation between IPOM and IPOM plus

Variables	IOPM		IOPM plus		p-value
	Mean	SD	Mean	SD	
BMI	25.54	3.54	25.46	2.69	0.575[#]
Defect size (in cm)	1.99	0.55	2.73	0.58	0.001[#]
Age	55.067	9.34	57.47	7.61	0.447*
*Independent-t Test was applied, [#]Mann-Whitney U test was applied					

Patients were equally distributed between the IPOM (n=15) and IPOM Plus (n=15) groups. A significant difference in defect size was observed between the two groups, with a larger mean defect size in the IPOM Plus group (2.73 cm ± 0.58) compared to the IPOM group (1.99 cm ± 0.55), with a statistically significant p-value of 0.001. No significant differences were observed in BMI and age distribution between males and females.

Between the IPOM and IPOM Plus groups, BMI differences were minimal, while defect size remained significantly larger in the IPOM Plus group, Table 4.

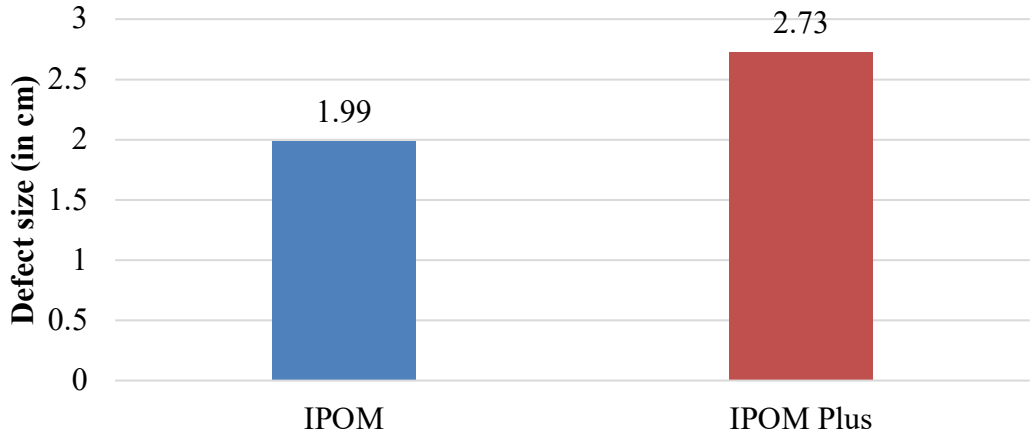

Figure 1: Defect size

A significant difference in defect size was observed between the two groups, with a larger mean defect size in the IPOM Plus group (2.73 cm ± 0.58) compared to the IPOM group (1.99 cm ± 0.55), with a statistically significant p-value of 0.001. Defect size remained significantly larger in the IPOM Plus group, Figure 1.

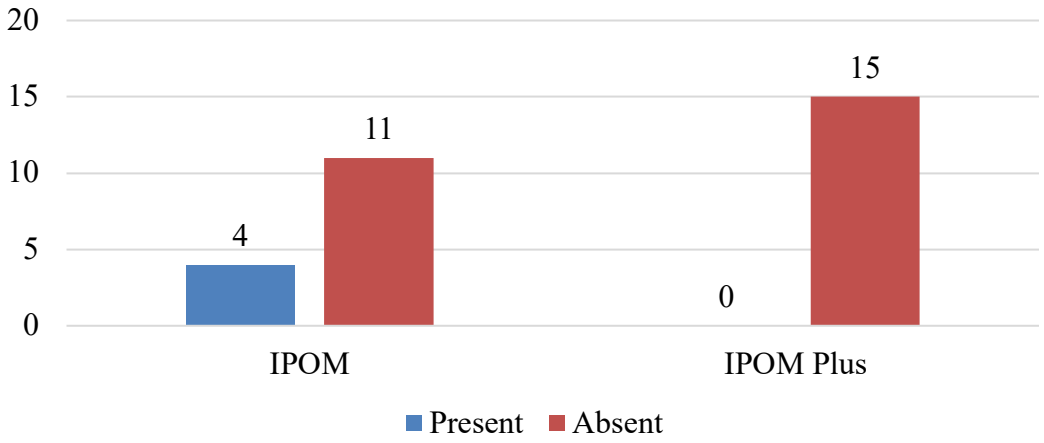

Figure 2: Seroma

Seroma was observed in 13.33% of patients. A significant difference was found between the two groups, with seroma formation occurring in 100% of cases in the IPOM group, whereas no cases were reported in the IPOM Plus group (p = 0.0317). This suggests a potential advantage of the IPOM Plus technique in reducing seroma formation, Figure 2.

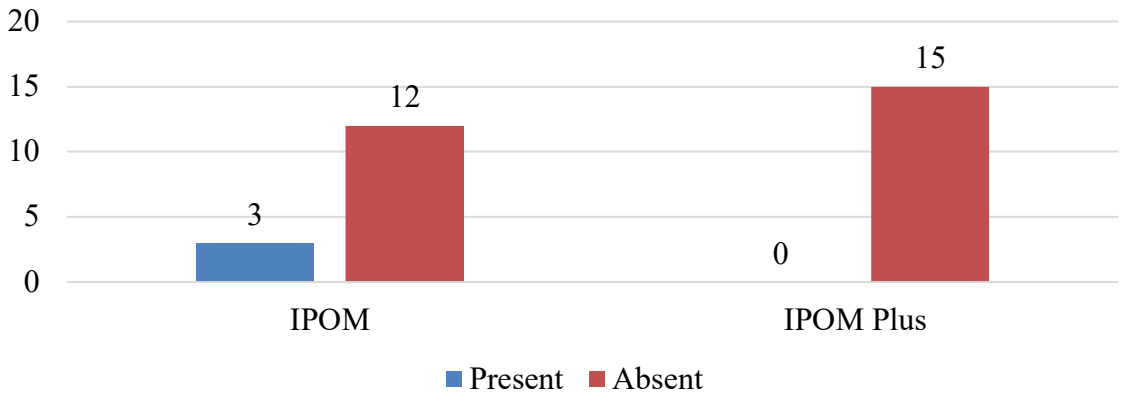

Figure 3: Recurrence

Figure 3, Recurrence was observed in 16.67% of cases, occurring exclusively in the IPOM group, while no recurrences were noted in the IPOM Plus group (p = 0.0476). These findings indicate that the IPOM Plus technique may be associated with a lower recurrence risk.

Discussion

Our research study highlights that the IPOM Plus technique may offer advantages over the IPOM technique in reducing seroma formation and recurrence rates. The findings emphasize the importance of considering defect size in surgical planning. We conducted this study to compare the outcome of laparoscopic IPOM with fascial defect closure versus without defect closure in midline ventral hernia repair in terms of seroma formation and recurrence. Our results also demonstrated a significant reduction in both seroma formation and the incidence of recurrence.

In this study, seroma formation was found in 0 (0.00%) patients for laparoscopic IPOM PLUS and 4 (14.29%) in those undergoing IPOM (P-value = 0.03). Recurrence was identified in zero patients (0.00%) patients undergoing laparoscopic IPOM plus and 3 (100.0%) in those undergoing laparoscopic IPOM without defect closure (P-value=0.047).

Ventral hernia is a major cause of functional impairment, abdominal pain, and bowel obstruction. The overall incidence of primary ventral hernia is estimated to be between 4% and 5% in the literature [9, 10]. However, issues related to laparoscopic ventral hernia repair such as the high recurrence rate of hernias with large fascial defects in extremely obese patients and seroma formation still cause problems. To overcome these problems, laparoscopic fascial defect closure with IPOM reinforcement (IPOM-plus) has been introduced in the past decade [11]. In our study, recurrence was found to be more common who underwent IPOM than in IPOM PLUS patients, which were 100.0% and 0.0% respectively. The difference in the prevalence of recurrence between the groups was supported by statistical significance with p value of 0.047.

A study published in 2019 comprising 100 patients divided into two groups showed that patients with defect closure had a lesser rate of seroma formation (10% versus 18%). It showed a lesser rate of recurrence with defect closure, that is, 6% versus 18% (P = 0.07) in the case of all ventral hernias. It showed a significant reduction of recurrence rate in the closure of midline ventral hernias, that is, 5% versus 24% (P = 0.04) [12]. Vascular Injury not presented in the patients while IPOM plus. Seroma formation was found in 4 (13.33 %) patients. Mesh bulging complications were found in 30 (100%) patients. Recurrence was identified in 20 (33.3%) patients. In our study in terms of frequency complications like seroma, mesh bulging and recurrence are more in patients undergoing IPOM plus than in IPOM. A recent systematic review of 3,638 patients concluded that IPOM-Plus was more effective than IPOM [13]. A multicenter study consisting of 1,594 patients showed that comparisons between both groups were negative for any significant statistical difference in terms of recurrence, seroma formation, surgical site infection (SSI), deep/organ space SSI, reoperation, and readmission [14].

Limitations

However, larger-sized studies are needed before making any definitive recommendations. Our study has several limitations. It is a prospective observation study with only a small number of patients. Additionally, the follow-up period was 6-month; a longer follow-up period would be necessary to assess the long-term outcomes of the procedures.

Conclusion

This study concludes that the frequency of postoperative seroma formation and recurrence was lower after laparoscopic (IPOM-Plus) in umblical hernia repair compared to laparoscopic IPOM. Also concluded that a significant reduction in both seroma formation and the incidence of recurrence.

Ethical approval: The study was approved by the Institutional Ethics Committee

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